

REMARKS

The Office Action dated February 20, 2003 has been received and carefully noted. The above amendments to the claims, and the following remarks, are submitted as a full and complete response thereto. Claim 1 is amended. No new matter is added. An Information Disclosure Statement is also submitted. In view of the above amendments and the following remarks, Applicant requests the favorable consideration of claims 1-8 is respectfully requested.

Applicant also would like to thank the Examiner for the interview conducted on June 17, 2003 with the Applicant's representative.

Claims 1-5, 7, and 8 were rejected under 35 U.S.C. 103(a) as being unpatentable over Hanoka et. al. (U.S. Patent No. 6,353,042) in view of Yamagishi et. al. (U.S. Patent No. 6,300,556) in view of Asano et. al. (U.S. Patent No. 5,456,764). Applicant submits claims 1-5, 7, and 8 recite subject matter that is neither taught nor suggested by the applied references.

Claim 1 is directed to a solar cell module comprising a front surface side light transmitting member containing at least sodium, a rear surface member which is a resin film, a solar cell element sealed with a sealing resin between the front surface side light transmitting member and the rear surface member. The solar cell element has a semiconductor junction formed with a p-type or n-type crystalline silicon substrate on which a transparent electrode is formed and an n-type or p-type thin film amorphous semiconductor layer on which a transparent electrode is formed. The crystalline substrate is positioned on a side of the front surface side light transmitting member, and the thin film amorphous semiconductor layer is positioned on a side of the rear surface side member.

The claimed invention recites a solar cell element that has a semiconductor junction formed with a p-type or n-type crystalline silicon substrate on which a transparent electrode is formed and an n-type or p-type thin film amorphous semiconductor layer on which a transparent electrode is formed. The crystalline silicon substrate is positioned on a side of a front surface side light transmitting member containing sodium, while the thin film amorphous semiconductor layer is positioned on a side of a rear surface member which is a resin film. In addition, since a transparent electrode is formed on a crystalline silicon substrate, the solar cell provides the benefit of generating electricity even with the

crystalline silicon substrate positioned on the side of the front surface side light transmitting member. Thus, it is respectfully submitted that the prior art fails to disclose or suggest the features of the Applicant's invention, and therefore fails to provide the advantages which are provided by the present invention.

Hanoka discloses a solar cell module having crystalline solar cells, wherein light can enter from both sides of the solar cell. Hanoka does not disclose a front surface member containing at least sodium and a solar cell element having a semiconductor formed with a p-type or n-type crystalline silicon substrate or a n-type or p-type semiconductor layer. Hanoka also does not teach or suggest the solar cell element having the semiconductor junction positioned at the crystalline silicon substrate on an opposite side of the front surface side light transmitting member.

Yamagishi discloses a solar cell module using amorphous silicon, in which soda lime glass is used as a substrate for forming the amorphous silicon.

Asano discloses a solar cell with a hetero-junction formed from amorphous silicon and crystalline silicon. The hetero-junction is formed on a light incident side of the crystalline silicon. Figure 4 of Asano illustrates a solar cell having a p-type polycrystalline silicon thin film. A quartz glass substrate 6 over which a $2\mu\text{m}$ thin film made of molybdenum was deposited to serve as the rear electrode 31. Over the molybdenum rear electrode 31, a p-type polycrystalline silicon thin film 11 was formed with a thickness of $5\mu\text{m}$. The n-type a-SiO:H thin film 2 is formed to a thickness of 100nm. A transparent electrode 4 is formed over the molybdenum rear electrode 31. Thus, light enters from a side of the a-SiO:H thin film 2 through the transparent electrode 4 since a thick molybdenum film is used as the rear electrode 31.

Figure 5 of Asano illustrates a solar cell comprising an n-type a-SiO:H thin film 2, a p-type polycrystalline silicon thin film 11 and a molybdenum thin film electrode 31 on a transparent electrode 4. However, Asano does not teach or suggest whether the molybdenum thin film is transparent. The order of the laminating of the polycrystalline silicon thin film 11 and the a-SiO:H thin film 2 as described in Figure 4 is reversed in Figure 5. Therefore, the molybdenum thin film electrode 31 in Figure 5 is also $2\mu\text{m}$ in thickness. It should be noted that a molybdenum electrode of such thickness is not transparent. As a result, light must enter from a side of the a-SiO:H thin film 2 through the transparent

electrode 4 in Figure 5.

As is apparent from the above analysis, the applied references taken either singly or in combination do not teach or suggest a solar cell element having a semiconductor junction formed with a p-type or n-type crystalline silicon substrate on which a transparent electrode is formed and an n-type or p-type thin film amorphous semiconductor layer on which a transparent electrode is formed. Accordingly, Applicant requests the withdrawal of the rejection of claim 1 under 35 U.S.C. 103(a).

Claims 2-5, 7, and 8 are dependent upon claim 1, therefore these claims for at least the reasons mentioned above, recite features that are neither taught nor suggested by the applied prior art. Accordingly, Applicant respectfully requests the withdrawal of the rejection of claims 2-5, 7, and 8.

Claim 6 is rejected under 35 U.S.C. §103(a), as being unpatentable over Hanoka et al. (U.S. Patent No. 6,353,042) in view of Yamagishi et al. (U.S. Patent No. 6,300,556) and in view of Asano et al. (U.S. Patent 5,456,764), as applied above to claims 1-5, 7 and 8 and further in view of Matsushita et al. (U.S. Patent No. 6,222,118). Applicant respectfully submits that claim 6 recites subject matter that is neither taught nor suggested by the applied prior art.

Matsushita discloses a solar cell element comprising a crystalline silicon substrate. The hetero-junction on the semiconductor layer is formed on a light incident side. However, Matsushita does not teach or suggest a solar cell element having a semiconductor junction formed with a p-type or n-type crystalline silicon substrate on which a transparent electrode is formed and an n-type or p-type thin film amorphous semiconductor layer on which a transparent electrode is formed. Thus, Matsushita does cure the deficiencies of Hanoka, Yamagishi, and Asano. Therefore, it is respectfully submitted that claim 6 recites features that are neither taught nor suggested by the applied art. Also, claim 6 is dependent upon claim 1, therefore for at least the reasons mentioned above, claim 6 likewise recites patentable subject matter. Accordingly, Applicant respectfully requests the withdrawal of the rejection of claim 6.

In view of the above amendments and distinctions discussed above, withdrawal of the rejections to claims 1-5, 7 and 8 are respectfully requested. Claim 1 is amended. No new matter is presented. An Information Disclosure Statement is also submitted. No new

matter is presented. Therefore, Applicant submits that the application is now in condition for allowance with claims 1-8 contained therein.

Should the Examiner believe the application is not in condition for allowance, the Examiner is invited to contact Applicant's undersigned attorney at the telephone number listed below.

In the event this paper is not considered to be timely filed, Applicant respectfully petitions for an appropriate extension of time. The Commissioner is authorized to charge payment for any additional fees which may be required with respect to this paper to Counsel's Deposit Account 01-2300.

Respectfully submitted,

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Enclosure: Information Disclosure Statement
Petition for Extension of Time